

Claims

1. A hydrogen storage alloy comprising:

10 to 40 atomic percent titanium;

0.5 to 80 atomic percent vanadium; and

10 to 60 atomic percent chromium;

5 said hydrogen storage alloy, at temperatures of 40°C or less, being adapted to reversibly store at least 1.75 weight percent hydrogen and desorb at least 60% of the maximum hydrogen storage capacity.

2. The hydrogen storage alloy according to claim 1, wherein said alloy further comprises one or more modifier elements selected from cobalt, iron, nickel, copper, ruthenium, rhenium, rhodium, copper, palladium, osmium, molybdenum, niobium, tungsten, platinum, iridium, silver.

3. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy comprises 0.5 to 4.5 atomic percent vanadium.

4. The hydrogen storage alloy according to claim 3, wherein said hydrogen storage alloy further comprises molybdenum.

5. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy comprises 61 to 80 atomic percent vanadium.

6. The hydrogen storage alloy according to claim 5, wherein said hydrogen storage alloy further comprises iron.

7. The hydrogen storage alloy according to claim 5, wherein said alloy further comprises palladium.

8. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy further comprises greater than 0 to 15 atomic percent manganese.

9. The hydrogen storage alloy according to claim 8, wherein said hydrogen storage alloy comprises 3.0 to 9.0 atomic percent manganese.

10. The hydrogen storage alloy according to claim 8, wherein said hydrogen storage alloy further comprises iron.

11. The hydrogen storage alloy according to claim 10, wherein said hydrogen storage alloy further comprises cobalt.

12. The hydrogen storage alloy according to claim 8, wherein said hydrogen storage alloy further comprises ruthenium.

13. The hydrogen storage alloy according to claim 8, wherein said hydrogen storage alloy further comprises cobalt.

14. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy further comprises up to 1.0 weight percent of one or more oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides including at least one metal selected from misch metal, magnesium, or calcium.

15. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy is adapted to reversibly store at least 2.0 weight percent hydrogen at temperatures of 40°C or less.

16. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy is adapted to reversibly store at least 2.3 weight percent hydrogen at temperatures of 40°C or less.

17. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy is adapted to desorb at least 65% of the hydrogen stored at the maximum hydrogen storage capacity at temperatures of 40°C or less.

18. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy is adapted to desorb at least 70% of the hydrogen stored at the maximum hydrogen storage capacity at temperatures of 40°C or less.

19. The hydrogen storage alloy according to claim 1, wherein said hydrogen storage alloy has a single phase body centered cubic crystal structure.

20. A hydrogen storage alloy comprising:
10 to 40 atomic percent titanium;
0.5 to 80 atomic percent vanadium;
10 to 60 atomic percent chromium; and
one or more scavenging elements adapted to scavenge oxygen, nitrogen, and carbon.

21. The hydrogen storage alloy according to claim 20, wherein said one or more scavenging elements react with oxygen, nitrogen, and carbon to form a secondary phase within said hydrogen storage alloy, said secondary phase comprising one or more of oxides, nitrides, carbides, oxycarbides, oxynitrides, carbonitrides, or oxycarbonitrides dispersed throughout said hydrogen storage alloy.

22. The hydrogen storage alloy according to claim 20, wherein said one or more scavenging elements are selected from misch metal, magnesium, calcium, or combinations thereof.

23. The hydrogen storage alloy according to claim 20, wherein said scavenging elements are present in said hydrogen storage alloy in an amount greater than 0.0 weight percent and less than or equal to 1.0 weight percent.

24. The hydrogen storage alloy according to claim 20, wherein said hydrogen storage alloy further comprises greater than 0 to 15 atomic percent manganese.